

BOOK REVIEWS

FLORA ZAMBESIACA, volume VII part 1, edited by E. Launert, with pp. vi + 394, including 89 line drawings, 1 colour frontispiece. London: Flora Zambesiaca Managing Committee, 1983. Soft cover. £23.50. ISBN 0 95076 82 00.

The appearance of a part of the *Flora Zambesiaca* is almost as welcome, especially in the Transvaal, as a part of the *Flora of Southern Africa* because, at a rough estimate, about 80% of the genera and about half the species in that area are common to the northern and eastern parts of our territory. The present part maintains the high standard of printing, editing and presentation that we have come to expect from the *Flora Zambesiaca* and deals with 17 families, 61 genera and 310 species. The families now disposed of are the following, with the numbers in brackets indicating genera and species:

- Escalloniaceae, by B. Verdcourt (1: 1)
- Crassulaceae, by R. Fernandes (4: 51)
- Valerianaceae, by J. F. M. Cannon (1: 1)
- Dipsacaceae, by Margaret and J. F. M. Cannon (3: 7)
- Goodeniaceae, by E. Launert (1: 1)
- Campanulaceae, by M. Thulin (4: 27)
- Sphenocleaceae, by M. Thulin (1: 1)
- Lobeliaceae, by M. Thulin (3: 46)
- Ericaceae, by R. Ross (6: 21)
- Plumbaginaceae, by A. R. Vickery (1: 3)
- Primulaceae, by F. K. Kupicha (4: 16)
- Myrsinaceae, by F. K. Kupicha (4: 6)
- Sapotaceae, by F. K. Kupicha (12: 29)
- Ebenaceae, by F. White (2: 35)
- Oleaceae, by F. K. Kupicha (5: 23)
- Loganiaceae, by A. J. M. Leeuwenberg (6: 38)
- Salvadoraceae, by A. R. Vickery (3: 4)

The sequence is basically that of the Bentham & Hooker system, but certain exceptions have been made as a matter of convenience. As pointed out in the preface, the Escalloniaceae and Crassulaceae should have been included in vol. IV, but the Crassulaceae were omitted from that volume due to the death of Dr Raymond-Hamet, who had undertaken to do the family for the *Flora Zambesiaca*. Furthermore, the Valerianaceae and Dipsacaceae would normally have been placed at the beginning of vol. V (now in preparation), but were included in the present volume in order that vol. V may be devoted entirely to the Compositae.

The editorial board have been fortunate in obtaining the co-operation of many leading authorities in the preparation of the taxonomic treatments and this makes for stability in the presentation. In addition, the text is supported by excellent line drawings, at least one per genus and, in larger and more "difficult" genera such as *Crassula*, *Wahlenbergia*, *Lobelia*, *Diospyros*, *Euclea* and *Strychnos*, there are several to each genus. In *Diospyros* there are as many as twelve, which indicates the considerable care with which Frank White has presented the Ebenaceae.

Families 105 (Myrsinaceae) to 110 (Salvadoraceae) were dealt with in the first part of the *Flora of Southern Africa*, which appeared as vol. 26 in the series in 1963, so a comparison is inevitable. With few exceptions, the species concept remains much the same, but there have been some name changes, largely due to some re-thinking on generic limits in the Sapotaceae. These changes have been published elsewhere during the intervening years and have been picked up in recent books on our trees by Palmer & Pitman and by K. Coates Palgrave. In the Oleaceae, the inclusion of *Linociera* Swartz in *Chionanthus* L. by Stearn (1980) is more recent.

There are also certain changes of emphasis or status on which opinions may differ, but which will be carried by the weight of the authority presenting them. Thus *Olea africana* is placed as a subspecies of the closely related and probably derivative *O. europaea*, which may seem illogical to the non-taxonomist. Perhaps the most noticeable differences are in the treatment of *Euclea*, where previously designated varieties have been rescheduled as subspecies and several new subspecies have been described, reflecting the detailed ecological and cytological investigations undertaken by White and his co-workers.

The inherent difficulties experienced by various workers in classifying the Crasulaceae are reflected in the number of infraspecific taxa upheld in the genus *Crasula* and the extensive notes on variability of species in *Kalanchoe*. Perhaps a further synthesis in the former may be justified when more material or the results of studies in the field become available.

A point which calls for closer investigation is whether *Mimusops zeyheri* Sond. is really distinct from *M. obtusifolia* Lam. (= *M. kirkii* Bak.). Both are upheld and, according to the key, both occur in the Transvaal. In the *Flora of Southern Africa* a broad view of the species was taken and *M. kirkii* was included in *M. zeyheri*. *M. obtusifolia* is, of course, the oldest name for the complex. Some careful field work is required to clarify the position.

Literature references are adequate, being restricted to the more important taxonomic works and relevant regional studies. Typification is given in detail when the plant originated in the Flora Zambesiaca region, otherwise just the country of origin is indicated. In many of the latter cases, the details are known and it is felt they could be given without adding unduly to the length of the text. On the other hand, some of the descriptions seem unnecessarily long. A good index facilitates reference work. Two new species and five new names at subspecies level are published in this part.

At £23.50 the price is not high for a publication of this standard, but places it beyond the reach of the average postgraduate and many interested laymen. It will, however, be an important reference work for anyone studying the flora of Africa south of the Sahara.

L. E. CODD

PLANT INFECTION: THE PHYSIOLOGICAL AND BIOCHEMICAL BASIS, edited by Y. Asada, W. R. Bushnell, S. Ouchi and C. P. Vance, with pp. xviii + 362. Tokyo: Japan Scientific Societies Press [and] Berlin, Heidelberg, New York: Springer-Verlag, 1982. US \$50.40. ISBN 3-540-11873-X.

A preface by the editors and a short tribute by J. Kuć to Professors K. Tomiyama and I. Uritani, are followed by 22 short papers read during a U.S.-Japan seminar held in 1981 at Brainerd, Minnesota. The papers review accumulated knowledge and recent progress (some previously unpublished) in research on the physiological and

biochemical basis of infection. Each paper is followed by a comprehensive list of literature references and a summary of oral discussion. There is a short subject index at the end of the book, but no general author index.

In the first text paper, Y. Asada outlines the substantial contributions made by workers in Japan to our knowledge of the physiology and biochemistry of plant infection. R. D. Durbin then briefly discusses disease determinants and symptom expression, and suggests that a logical step-by-step analysis of the relationship of disease determinants to symptom expression will help us to explain plant diseases on a chemical basis. R. T. Sherwood and C. P. Vance review events occurring in epidermal cells during penetration by *Erysiphe graminis* and *Helminthosporium avenae*, with special attention to wall appositions and papilla formation. H. Kunoh summarises work on relations between primary germ tubes and the host plant during early stages of germination of *Erysiphe graminis* conidia.

In one of only two papers devoted solely to bacterial infection W. D. Bauer discusses the infection of soybean roots by *Rhizobium japonicum*, with particular attention to the initiation of infection (including the role of lectins) and host specificity.

There are three papers on hypersensitivity. N. Doke *et al.* describe aspects of elicitation and suppression of the hypersensitive response of host cells in the potato-*Phytophthora infestans* system. W. R. Bushnell reviews recent work on patterns of hypersensitivity to rusts and powdery mildews, and suggests that compatible fungi produce suppressors which limit the reaction. In his contribution (somewhat misplaced near the end of the book), K. Tomiyama describes hypersensitive cell death as a "key phenomenon in disease resistance" and as a "suicide response which saves the rest of the tissue from destruction". S. Ouchi and H. Oku enlarge on the concept that disease resistance is the rule in nature and that, in order to establish parasitic ("pseudosymbiotic") relationships with the host cells, pathogens must produce impediments ("impedins") to the host defence reactions. J. Kuć compares host resistance mechanisms with those provided by systemic fungicides, and develops a case for greater recognition of the potential for disease control by plant immunisation. K. Ōba *et al.* describe metabolic alterations in response to wounding and infection, with special reference to phytoalexin production in sweet potato roots. T. Kosuge and L. Comai discuss the role of indoleacetic acid in the *Pseudomonas savastanoi*-oleander/olive interaction and develop concepts involving secondary metabolites in the plant-pathogen interaction. R. J. Kemble and D. R. Pring review studies on mitochondrial DNA associated with cytoplasmic male sterility and *Helminthosporium maydis* susceptibility in maize carrying Texas cytoplasm.

Host specific toxins are dealt with in four papers. S. Nishimura *et al.* discuss the involvement of host-specific toxins in the pathology and epidemiology of diseases of different hosts caused by *Alternaria alternata* pathovars. J. M. Daly discusses the chemistry of host-specific *Helminthosporium* toxins and suggests that further work should enable us to resolve their modes of action on a molecular basis. T. Ueno *et al.* discuss the chemistry of host-specific *Alternaria* toxins, with K. Kohmoto *et al.* presenting evidence that the host chloroplast and the interface between cell wall and plasma membrane are two primary action sites for the AM toxin of the apple pathotype of *A. alternata*.

Needless to say, phytoalexins also receive considerable attention. In addition to the paper by K. Ōba *et al.*, M. Yoshikawa and H. Masago discuss biochemical aspects of the phytoalexin glyceollin and its elicitation in soybean by *Phytophthora megasperma* f. sp. *glycinea*. N. T. Keen then describes a direct phytoalexin elicitor-receptor model in gene-for-gene systems. In their discussion on phytoalexins and preformed antifungal compounds in relation to resistance of oat leaves to fungal attack, T. Tani and S. Mayama emphasise that there are "multiple mechanisms involved in induced resistance" and suggest that "plants respond to challenging micro-

organisms in quite different manners depending on the specific properties of the invading microorganisms". The series of papers on phytoalexins ends with a final exciting contribution by H. D. Vanetten on phytoalexin detoxification by fungal monooxygenases. In the final chapter of the book I. Uritani emphasises the contribution which studies of host-plant interactions have made to our understanding of the biochemistry and physiology of the normal plant.

The non-specialist often finds papers on the physiology of parasitism difficult to read. Both specialist and non-specialist will find this text interesting and readable. The graduate student will find the short overviews useful for their subject content, and he will be stimulated by the differences in emphasis and interpretation given to the different research results. In the South African context, the book will be read by the university teacher and by the research worker on host-parasite interactions. Individual chapters will undoubtedly be prescribed for both graduate and undergraduate students in plant pathology and plant physiology.

P. S. KNOX-DAVIES

FERTILIZATION OF DRYLAND AND IRRIGATED SOILS, by J. Habin and B. Tucker, with pp. vii + 188 and 64 figures. Berlin, Heidelberg, New York: Springer-Verlag, 1982. Volume 12 in "Advanced Series in Agricultural Sciences". DM98, approximately US \$39.20. ISBN 3 540 11121 2.

This small, 188-page and well-produced book is clearly aimed at the advanced agricultural student. And as so much of South Africa is either dryland or irrigated, the subjects it discusses are of great topical interest. However, it is also of very considerable interest to botanists, nutritionalists, ecologists or pathologists, for whom a knowledge of soils and farming practice is very desirable, if not imperative.

This publication has a number of very unusual, but very useful, features. Each of its seven chapters has two footnotes. The first of these is entitled *Purpose* and briefly states what the authors intend to discuss. This is followed by another footnote with advice to the student, enumerating facts that he should learn. At the end of the chapter, there is always a list of questions preceding the references. These features make it an excellent book from which to study, and are even a help when using it for general reference purposes.

The book starts by defining its terms and then giving an adequate account of soil characteristics—no more is needed for this work. The same is true for crop production systems and irrigation. The reader is introduced to these topics as far as is necessary for the general comprehension of the fertilizer story.

The fertilizer story is very well told and most plant physiologists will read this book with interest, although it is unlike nutritional texts in many respects. The section on Nitrogen, over 20 % of the book, deals with the manufacture, uses and abuses of a large variety of nitrogenous fertilizers, the fate of the fertilizers in the soil by leaching and volatilization. The requirements of over ten crops are discussed.

This book is well documented. However, no authority is cited for the point made on p. 33 "Nitrates appear to be the preferred form of nitrogen by most plants, even though ammonium ions are also utilized by plants, *especially in the early growth stages*". This is probably true, but I have never seen it stated before.

The phosphorus and potassium chapters are equally informative but there is not the space to discuss them here, save to say that there is a lot of solid informative work available for the reader to digest. This is true of the secondary and micro-

nutrients as well. In all cases, details of fertilizers deficiencies, treatments and special crops are supplied. The section on iron is one that will be of very wide biological interest. The availability of this element in both plants and animals causes much concern. The authors draw attention to the chlorosis tolerant plants which can regulate the pH of their root exudates and appear to benefit from citrates to chelate the iron. Ecologists will appreciate the influence that litter plays in making iron available to plants.

This is a really excellent book and the authors are to be congratulated on its appearance. There are some good simple illustrations, but the photographs of granules of fertilizers or a tractor and ammonia cylinder do little to improve the text and are unnecessary. No serious misprints were observable and the only comment I would like to add is that the statement about molybdenum deficiencies not occurring in semi-arid regions (p. 136) does not apply to the Cape.

This excellent book should be on the reference shelf of every concerned botanist, especially the younger field workers. It is very informative and very readable. However, its price will be too high for those who would benefit most from its possession. What about a cheaper edition?

K. H. SCHÜTTE

